

U.S. Patent Application No. 09/857,490
Amendment After Final dated June 21, 2006
Reply to Final Office Action of March 30, 2006

REMARKS/ARGUMENTS

Reconsideration and continued examination of the above-identified application are respectfully requested.

The amendment to the claims further defines what the applicants regard as the invention. In particular, claim 15 has been amended to recite "wherein the oxidant gas stream provides oxygen in an amount of less than 80% of the amount required to completely combust components of the off-gas and supplemental gases" and "controlling the combustion gas feed stream and oxidant gas feed stream with control means comprising sensor means." Claim 18 has been amended to recite "wherein the carbon black furnace to which the combustion gas feed stream and oxidant gas feed stream are selectively fed is a different carbon black furnace from the carbon black furnace of step (a)." Full support for this amendment can be found throughout the present application, for example, at page 10, page 5, and page 3, lines 30-31. No new questions of patentability should arise nor does the amendment necessitate any further searching on the part of the Examiner. The amendment places the application in condition for allowance. At a minimum, the amendment places the application in a better condition for appeal. Accordingly, no questions of new matter should arise and entry of this amendment is respectfully requested.

The amendments presented herein are made with an effort to assist the Examiner with respect to the patentability of the present invention. The applicants believe that the claims as pending prior to this response are patentable in view of the cited references for the reasons previously given.

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Rejection of claims 2 and 15-18 under 35 U.S.C. §103(a) over Rothbuhr et al.

At page 2 of the Office Action, the Examiner rejected claims 2 and 15-18 under 35 U.S.C. §103(a), as being unpatentable over Rothbuhr et al. (U.S. Patent No. 4,636,375). Particularly, the Examiner alleged that Rothbuhr et al. teaches treating carbon black off-gas to remove water and carbon, then recycling it, and that the fuel rich mode is suggested as an option in cols. 1 and 2 of Rothbuhr et al. For the following reasons, this rejection is respectfully traversed.

The applicants continue to disagree with the Examiner's rationale for making this rejection.

To assist the Examiner, claim 15 has been amended to recite "wherein the oxidant gas stream provides oxygen in an amount of less than 80% of the amount required to completely combust components of the off-gas and supplemental gases," and "controlling the combustion gas feed stream and oxidant gas feed stream with control means comprising sensor means." The applicants submit that Rothbuhr et al. does not teach or suggest these two features.

To further assist the Examiner, claim 18 has been amended to recite "the carbon black furnace to which the combustion gas feed stream and oxidant gas feed stream are selectively fed in a different carbon black furnace from the carbon black furnace of step (a)." The applicants submit that Rothbuhr et al. does not teach or suggest using a carbon black furnace to which the combustion gas feed stream and oxidant gas feed stream are selectively fed is a different carbon black furnace from the carbon black furnace of step (a) as claimed.

Independent claim 15 of the present application relates to a furnace carbon black-producing process wherein off-gas from a carbon black furnace is dewatered and heated, following substantial removal of carbon black therefrom, and fed as at least a part of a combustion gas feed stream to a burner portion of the carbon black furnace. The claim explicitly provides that the combustion gas

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feed stream and the oxidant gas feed stream are controlled to provide a fuel-rich condition so that the combustion gas does not completely combust in the burner portion of the carbon black furnace. Further, the claim describes the carbon black furnace as being a type in which a combustion gas is combusted in the presence of an oxidant gas in a burner portion of the furnace to produce hot combustion gases and then the hot combustion gases interact with a hydrocarbon feedstock in a reactor portion of the furnace. Therefore, claim 15 explicitly recites that the claimed process is fuel-rich and clarifies that the characterization of the process as fuel-rich includes the combustion of the combustion gas feed stream in the presence of the oxidant gas feed stream in the burner portion of the furnace.

As discussed in Applicants' previous responses, Rothbuhr et al. does not teach or suggest any instance in which a fuel-rich condition is used in a process wherein an off-gas is recycled. In particular, col. 1 of Rothbuhr et al. describes the effects varying the parameters of the amount of combustion air (the "oxidant gas" in the present claims), fuel gas (the "combustion gas feed stream" in the present claims) and carbon black raw material (the "hydrocarbon feedstock" in the present claims) and states, at column 1, lines 45-48, that "[t]he fuel gas required for energy production (or some other fuel) is mostly employed in such volumes, related to the volume of oxygen introduced with the combustion air, that it is present in deficiency." One skilled in the art, by reading Rothbuhr et al., at col. 1, lines 45-48, would clearly understand that it is the fuel gas that is present in deficiency. Thus, the process described at col. 1, lines 45-48, is a fuel-lean process, which teaches away from the claimed invention.

Rothbuhr et al., at col. 1, lines 49-52, also states that "...it is one of the principles of the furnace black process that the volume of oxygen is used in deficiency relative to the fuel and carbon

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black raw material volume.” (Emphasis added) In other words, the volume of oxygen is less than the combined volume of fuel and carbon black raw material. If the volume of oxygen is equal to or more than the combined volume of fuel and carbon black raw material, the oxygen would completely burn the carbon black raw material and the process would not result in production of a carbon black. The statement at col. 1, lines 49-52, does not indicate that the volume of oxygen is less than the volume of fuel by itself. In fact, one skilled in the art, by reading Rothbuhr et al., at col. 1, lines 49-52, in view of Rothbuhr et al., at col. 1, lines 45-48, would conclude that the amount of oxygen is more than the amount of fuel, but not more than the combined amount of fuel and carbon black raw material. In claim 15 of the present invention, on the other hand, it is clearly specified that the fuel-rich condition occurs in the burner portion of the carbon black furnace as a result of controlling the combustion gas feed stream and the oxidant gas feed stream.

In addition, Rothbuhr et al., at col. 1, lines 52-56, states that “...whenever as little as possible air-oxygen is to come into contact with the carbon black raw material and is to burn the latter, as high volumes as possible as fuel gas are used.” The statement at col. 1, lines 52-56, on its face, would appear to indicate a trend to run a process wherein the amount of fuel reaches or approaches stoichiometric. However, although col. 1, lines 52-56, indicates an increase in the amount of fuel, according to Rothbuhr et al., at col. 1, lines 58-62, the amount of fuel cannot be greater than the amount of oxygen because such a process would damage the liner of the reactor. See Rothbuhr et al., wherein Rothbuhr et al. teaches away from having a fuel-rich process by stating, at col. 1, lines 58-62, that a high amount of fuel leads to higher temperature loads, which can destroy the inner liner of the reactor. For the reasons set forth above, Rothbuhr et al. at col. 1, lines 45-63, clearly describes a fuel-lean process.

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Moreover, Rothbuhr et al., at cols. 7 and 8, further emphasizes the production of carbon black using a fuel-lean process by stating that the process includes an air volume constant of 27 Nm³/h and a natural gas constant of 1.9 Nm³/h. One skilled in the art would recognize that an air volume constant of 27 Nm³/h and a natural gas constant of 1.9 Nm³/h relate to a fuel-lean process.

Moreover, in several other places, Rothbuhr et al. clearly characterizes its process as being a fuel lean process. See, for example, col. 3, lines 47 - 60 and col. 9, lines 45 - 49.

Since the claimed invention relates to a process using a fuel-rich process and Rothbuhr et al. uses a fuel lean process, Rothbuhr et al. does not teach or suggest the invention of claim 15. Moreover, Rothbuhr et al. does not teach or suggest deep rich fuel conditions or a process in which the heated, dewatered off-gas is the only combustible gas supplied to the burner of a carbon black furnace as required by dependent claim 2. Accordingly, the rejection under 35 U.S.C. §103(a) over Rothbuhr et al. should be withdrawn.

Therefore, this rejection should be withdrawn.

Rejection of claims 3 and 8 under 35 U.S.C. §103(a) over Rothbuhr et al. in view of Sircar and Doshi

At page 2 of the Office Action, the Examiner rejected claims 3 and 8 under 35 U.S.C. §103(a) as being unpatentable over Rothbuhr et al. as applied to claims 2 and 15-18 and further in view of Sircar (U.S. Patent No. 5,240,472) and Doshi (U.S. Patent No. 4,690,695). Particularly, the Examiner alleged that Rothbuhr et al. teaches water removal, but does not specify PSA. The Examiner further alleged that Sircar teaches using PSA to de-water gas and that Doshi teaches separating oxygen by PSA. For the following reasons, this rejection is respectfully traversed.

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The applicants continue to disagree with the Examiner's rationale for making this rejection. To assist the Examiner, claims 15 and 18 have been amended as indicated above. Sircar and Doshi do not cure the deficiencies of Rothbuhr et al. as noted above.

As discussed above, Rothbuhr et al. does not teach or suggest the limitations of independent claim 15. In particular, Rothbuhr et al. does not teach or suggest any instance in which a fuel-rich condition is used in a process wherein an off-gas is recycled, but rather teaches producing carbon black in a fuel-lean condition. Sircar and Doshi do not relate to carbon black producing processes and do not overcome the deficiencies of Rothbuhr et al. described above. Therefore, claims 3 and 8 are allowable for the same reasons that independent claim 15 is allowable over Rothbuhr et al. as discussed above. Further, regarding the specifics of claims 3 and 8, and with respect to the Examiner's comment that if the applicants claim a PSA process then any PSA reference is considered analogous, the applicants respectfully disagree. Sircar, at col. 5, lines 52-56, states that residual water and carbon dioxide can be removed from a nitrogen-containing gas stream, such as air, by methods such as PSA. The Examiner has not provided any proper motivation why one skilled in the art would look to Sircar for PSA. Certainly, the primary reference does not provide any motivation and Sircar does not relate to carbon black. With respect to Doshi, this patent relates to a permeable membrane for initial bulk gas separations which makes use of a pressure swing adsorption system. From a reading of Doshi, there is no teaching or suggestion of using this system in the manufacturing of carbon black. Accordingly, Doshi is also non-analogous art with respect to the claimed invention and, furthermore, one skilled in the art would not look to Doshi and combine it with the production of carbon black patent relied upon by the Examiner, namely Rothbuhr et al. The only motivation that one would have for applying this technology to carbon black would be

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through the use of hindsight or an obvious to try standard, both of which are improper for purposes of determining patentability.

Accordingly, the rejection under 35 U.S.C. §103(a) over Rothbuhr et al. in view of Sircar and Doshi should be withdrawn.

Rejection of claims 4-7 under 35 U.S.C. §103(a) over Rothbuhr et al. in view of Lynum et al.

At page 2 of the Office Action, the Examiner rejected claims 4-7 under 35 U.S.C. §103 over Rothbuhr et al., as applied to claims 2 and 15-18 and further in view of Lynum et al. (U.S. Patent No. 5,527,518). In particular, the Examiner alleged that Rothbuhr et al. does not explicitly teach reheating the recycled gas using plasma heating, but that Lynum et al. teaches this technique to make carbon black, and that it is an obvious expedient to assure efficient combustion and restore heat lost during the water removal steps. For the following reasons, this rejection is respectfully traversed.

The applicants continue to disagree with the Examiner's rationale for making this rejection. To assist the Examiner, claims 15 and 18 have been amended as indicated above. Lynum et al. does not cure the deficiencies of Rothbuhr et al. as indicated above.

As discussed above, Rothbuhr et al. does not teach or suggest the limitations of independent claim 15. In particular, Rothbuhr et al. does not teach or suggest any instance in which a fuel-rich condition is used in a process wherein an off-gas is recycled, but rather teaches producing carbon black in a fuel-lean condition. Lynum et al. does not overcome these deficiencies of Rothbuhr et al. Therefore, claims 4 - 7 are allowable for the same reasons that independent claim 15 is allowable over Rothbuhr et al., as discussed above. Moreover, regarding claims 4 - 7, Lynum et al. relates to passing a preheated feedstock of methane and/or natural gas through a plasma torch to cause a

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pyrolytic decomposition of the feedstock. Thus, Lynum et al. does not teach or suggest recycling the off-gas, and further plasma heating of the off-gas which has been preheated to a certain degree via a suitable heat exchanger. According to Lynum et al., a plasma torch increases the temperature of the feedstock to the decomposition temperature for the raw material. This temperature is too high to be used for merely preheating the feedstock. Lynum et al. does not teach that the gases transported in a return pipe to the torch are preheated. Thus, one skilled in the art, by reading Lynum et al., would not use a plasma torch to heat an oxidant gas feed stream, to preheat the combustion gases produced in a burner portion of the same, or to preheat the combustion gases produced in a burner portion of a different carbon black furnace. Instead, one skilled in the art, by reading Lynum et al. would conclude that a plasma torch is only used to decompose the feedstock instead of preheating the feedstock. Accordingly, one skilled in the art, by reading Rothbuhr et al. in view of Lynum et al., would not select the elements from the two references for combination in a manner claimed by the applicants. The only way this rejection can be made is by the improper use of hindsight, by the improper use of an obvious to try standard, and/or by the manipulation of the references in a manner not taught or suggested by the references.

Accordingly, the rejection under 35 U.S.C. §103(a) over Rothbuhr et al. in view of Lynum et al. should be withdrawn.

The Examiner is encouraged to contact the undersigned by telephone should there be any remaining questions regarding the patentability of present invention or if the Examiner believes any Examiner's amendment would put the application in condition for allowance.

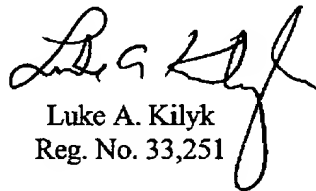
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CONCLUSION

In view of the foregoing remarks, the applicants respectfully request the reconsideration of this application and the timely allowance of the pending claims.

If there are any fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,



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